



TPF Science, Technology, and Design Expo '03



Structurally Connected Interferometer

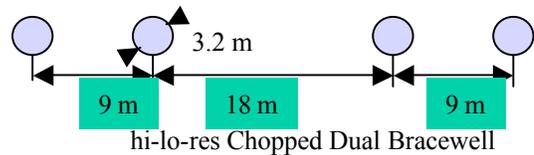
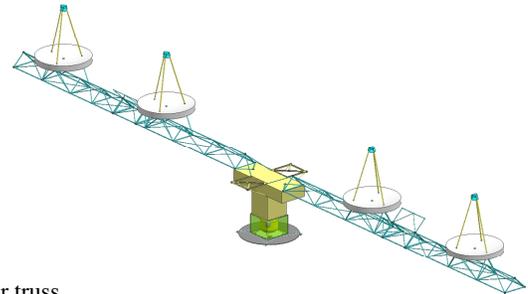
Program/Theme: Origins of Stars, Planets, and Life

Science Objectives: Search for Earth-Like Planets In the Habitable Zone Around Nearby Stars

1. Survey ≥ 30 stars for terrestrial planets
2. Measure planets' orbit, mass, and presence of biomarkers in the atmosphere ($\text{CO}_2, \text{CH}_4, \text{O}_3$)
3. Observe astrophysical sources (i.e. active galaxies)

Mission Description:

1. Structurally Connected Interferometer-- 4 telescopes supported on a linear truss
2. Infrared Nulling Interferometer operating at cryogenic temps
3. Observatory flies in L2 Halo orbit for low disturbance enviro.

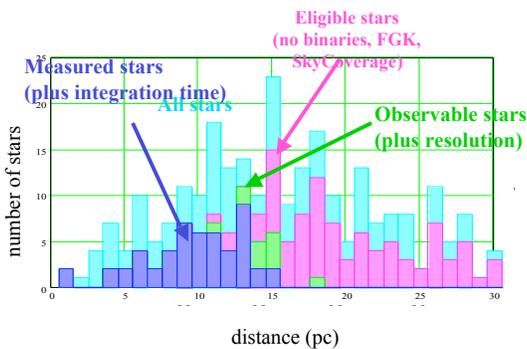


Key Enabling Technologies

	TRL	Type
Precision Pathlength Control	5	Enabling
Precision Wavefront Control	4	Enabling
Adaptive nuller	2	Enabling
Cyro-actuators	5-6	Enabling
Large Deployable Sunshield	5-6	Enabling
Nulling Beam Combination	3	Enabling
Metrology	3	Enabling
Detectors	5-6	Enabling
Thrusters	4-6	Enabling
Primary Mirror	4-6	Enabling
Cyrocooler	3-4	Enabling

Instrument	
Telescopes	4
Aperture Diameter	3.2
Baseline	36
Angular Resolution (max)	50-75 milli-arcsec
Stellar Light Rejection	$> 10^6$
Field of View	1-5 arcmin
Field of Regard	± 45 deg anti-sun
Wavelength Range	7-17 μm
Spectral Resolution	$\lambda/\Delta\lambda = 100$
Telescope Temp.	< 40 K
Detector Temp.	< 6 K

Observatory	
# of Collectors	4
Design Life	10 years
Attitude Control	3-axis
Pointing Accuracy	15 as
Pointing Knowledge	10 as
HGA Pointing	3-axis
Solar Array Pointing	3-axis
Data Downlink Rate	486kbps
Downlink Frequency	X-band
Onboard Data Storage	1.1 GB
Uplink Data Rate	2000 bps
Uplink Frequency	X-band
Mission ΔV	650 m/s



Item	Mass
Collectors (4 ea.)	405 kg
Combiner	537 kg
Spacecraft	1052 kg
Truss, Etc.	1467 kg
Total Launch Mass	4679 kg
Total Margin	4725 kg

Trajectory	
C3	-0.69
ΔV (TCM's)	105 m/s
Launch Vehicle	Delta 4050H
Duration	100 days
Mission Orbit	L2 Halo

DC Power	
Predicted Max	1495 W
Margin	30%
Power Avail.	1950 W